

In the Specification

[0011] FIGS. 6-7 are cross sections of an in-process semiconductor device formed according to a second embodiment of the invention which results in capacitor bottom plates; and FIGS. 8-10 are cross sections of an in-process semiconductor device formed according to a third embodiment of the invention to form a self-aligned cobalt silicide layer on polysilicon plugs;

[0012] FIG. 8 FIG. 11 is an isometric depiction of a use of the invention in an electronic device; and

[0013] FIG. 9 FIG. 12 is a block diagram of an exemplary use of the invention to form part of a memory array in a dynamic random access memory.

[0021] After exposing the surfaces to cyclopentadienylcobalt dicarbonyl to form the initial layer 30, a reducer such as hydrogen (H₂) is flowed into the chamber at a flow rate of between about 50 sccm and about 1,000 sccm for a duration of between about 0.1 seconds and about 10 seconds. The hydrogen reduces the layer over the surface of the wafer substrate assembly to leave cobalt metal 32 covering the surface as depicted in FIG. 3. The remaining products of the reaction are then pumped out of the chamber. The reduction of layer 30 to cobalt metal 32 has not been fully studied, and the byproducts produced are not known. However, upon reduction of initial layer 30 to metal, the process produces less than a complete blanket layer of metal and the process needs to be repeated several times to ensure complete coverage of the metal across the exposed assembly surface. It is estimated that a single cycle comprising precursor formation then reduction of the precursor results in a metal layer which covers about 33% of the exposed surface with metal, and forms a cobalt layer about 0.7 angstroms (Å) thick.